

Public Schools of Brookline - Expert Advisory Panel #4 (Public Health, Safety, and Operations)

Panel Statement on Indoor Space Ventilation

DRAFT August 12, 2020 -- SUBJECT TO REVISION AND FINAL PANEL VOTE

Our panel is composed of Brookline parents with expertise in public health who are assisting the Brookline School Committee with the difficult process of re-opening the Public Schools of Brookline. Below is a high-level summary of the discussions the panel has had since June 12, 2020 on the subject of indoor space ventilation. For more technical information, minutes, and recordings of the meetings, please refer to the [school website](#).

Advisory Panel 4 Members

Dr. Elena Savoia, Deputy Director, Emergency Preparedness Program, Harvard School of Public Health (co-chair)

Mr. David Gacioch, Partner, McDermott Will & Emery LLP (co-chair)

Ms. Lan Dennie, RN, BS, CMAC, Occupational Health Nurse, Fenway Health

Dr. Benjamin Linas, Infectious Diseases Physician, Boston Medical Center

Dr. Nira Pollock, Associate Medical Director, Infectious Diseases Diagnostic Laboratory, Boston Children's Hospital; Assoc Professor of Pathology, Harvard Medical School

Mr. Boris L. Perlovsky, Director, Innovation Strategy. Cambridge Innovation Center

Dr. Serena Rajabiun, Assistant Professor of Public Health, University of Massachusetts, Lowell

Dr. Vishakha Sabharwal, Pediatric Infectious Diseases, Boston Medical Center

Dr. Benjamin Sommers, Professor of Health Policy & Economics, Professor of Medicine, Harvard T.H. Chan School of Public Health / Brigham & Women's Hospital

Dr. Lakshman Swamy, Pulmonary/Critical Care physician and Medical Director at MassHealth Payment & Care Delivery Innovation

Dr. Jenny Tam, Senior Staff Scientist, Wyss Institute, Harvard University

Ventilation standards for each individual classroom and other space being used for in-person learning should exceed those set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and match as closely as possible the recommendations of the Healthy Buildings Team based at the Harvard T.H. Chan School of Public Health.

1. [ASHRAE](#) recommendations for reducing the risk of infectious aerosols include increasing outdoor air ventilation, improving HVAC filtration to MERV-13 or the highest level achievable, keeping systems running longer hours, and adding portable room air cleaners with HEPA or high-MERV filters when needed. Panel 4 generally endorses these recommendations, subject to further details below. That said, ASHRAE's pre-COVID design standards for minimum air flow in classrooms do not, in our panel's view, sufficiently reduce COVID transmission risk, so we recommend enhanced indoor ventilation standards as detailed below.

2. The Harvard T.H. Chan School of Public Health [Healthy Buildings Team](#), led by Dr. Joseph Allen, recommended to our panel that all indoor rooms should meet at least one of two clean air ventilation targets through a combination of (a) fresh outdoor air, (b) recirculated air filtered at MERV 13 level or higher (for rooms with mechanical ventilation), and (c) use of portable air cleaners with HEPA filters:

- **OPTION 1: At least 5.0 air changes per hour (ACH) of clean air**—with the Healthy Buildings Team defining 4-5 ACH as “good,” 5-6 ACH as “excellent,” and 6+ ACH as “ideal”; **OR**
- **OPTION 2: At least 15 liters per second per occupant of clean air**, allowing for de-densification of occupancy of rooms that cannot fully meet the ACH-based target as a complimentary ventilation strategy.

3. Panel 4 endorses these enhanced ventilation targets, which approximately double the ASHRAE design standard for indoor air quality in public buildings. HEPA-filtered portable air cleaners should be deployed broadly across PSB spaces wherever needed to meet these targets—matched to room size by minimum clean air delivery rate (CADR) for each unit (see the Healthy Building Teams [tool](#)) and centrally located in rooms as much as possible. Note that the Healthy Buildings Team recommends avoiding add-on technologies (e.g., plasma, UV, ion generators) and relying instead on good filtration.

4. As weather and climate conditions allow, opening windows may also be helpful in increasing clean air ventilation rates toward the targets above, with fans placed in windows to facilitate movement of outdoor air to indoors, where necessary. (Such measures obviously are only helpful as long as room occupants are willing to keep windows open and fans running, so may be less reliable as fall turns to winter.) Window fans, unit ventilators, and portable air cleaners should be placed/configured such that their air flows do not blow directly across individuals onto adjacent individuals.

5. Rooms that do not meet either of the two clean air targets endorsed here should only be used for storage, for passage (e.g., hallways), or for individual work spaces that are not occupied by more than one person simultaneously or in rapid succession. Bathroom fans should also be checked to confirm appropriate exhaust volume performance and then operated continuously while schools are occupied.

6. Our panel supports the use of each individual classroom and other building space as soon as it meets these targets, even if other rooms in a given building still require additional modifications. We also recommend routine monitoring of all school spaces once occupied to ensure that HVAC systems are actually delivering target rates of clean air on a consistent basis.

Panel 4 is deeply grateful for the expert advice and close support we have received from Dr. Allen and the Harvard Healthy Buildings Team in developing these recommendations.